

Tea-Intercropping – A socio-environmental study in Xishuangbanna, southwest China

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ABSTRACT

In the mountainous areas of Xishuangbanna, South-West China, farmers of high and low altitudes drift apart by rapid development of the rubber industry. Farmers in the high altitudes, where rubber cannot be grown, are looking for alternative livelihoods. These include agricultural innovations such as tea-intercropping. This study uses qualitative methods to examine how high-altitude villages' adoption of innovations, and examines how society and environment mutually influencing each other.

KEYWORDS

Tea-intercropping, agriculture innovation, co-evolution, Xishuangbanna, China

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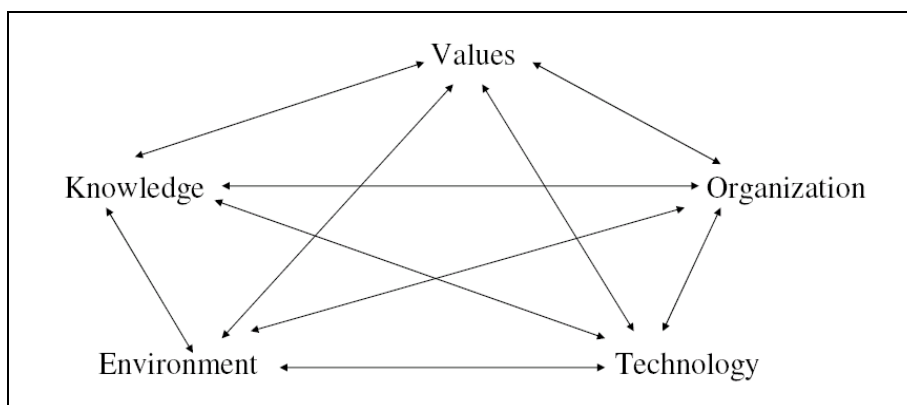
1. INTRODUCTION

In recent years, villages in the mountainous area of Xishuangbanna prefecture of Yunnan province, China drifted apart by rapid development of the rubber industry. Farmers in the lowlands are able to enjoy economic benefits deriving from the constant demand for rubber. This is mainly due to China's growing auto industry and – as a result – an increase in the prices of rubber, backed up by the federal government giving incentives in order to produce more rubber (Tang et al. 2009). This pushed the clearing of forests for growth of rubber to as high altitude as possible which is known to be limited to about 1,000 m a.s.l. In Xishuangbanna Prefecture in the southern part of Yunnan Province, as a consequence minority nationality groups such as Akah (Hani) and Lahu who live both in the low and high altitudes, are now separated by the imaginary rubber line. For some farmers this means that relatives who live under 1,000 m a.s.l. earn a great deal more than those who live above that line. Their economic uncertainty for the short term is reduced and income for the next decades is promised. Those who live above that line, in contrast experience relatively slow economic growth, and are therefore looking for alternative livelihoods, namely trying recently introduced agricultural innovations.

Apart from altitude several other parameters are involved in the need to introduce agricultural innovation, and in the process of adopting such innovations. Indeed, the process of introducing and adopting agriculture innovations is dependent on various environmental parameters (biological and physical) and those of the social, cultural and economic spheres (ROGERS 2003).

The aim of this paper is to analyse the development of social and ecological systems in relation to farmers' adoption of innovations. The main research question was: how do societies evolve in relation to their environment and their adoption of agricultural innovations?

Figure 1: Coevolution Scheme of Rural Development



Source: NORGAARD, 1994

Richard NORGAARD's (1994) theory of socio-environmental coevolution has been used as an analytical framework (figure 1) in this paper. NORGAARD states that social and environmental systems coevolve in such a way that the environmental system reflects the characteristics of the social system, and the social system reflects the characteristics of the environmental system. The acceptance and adoption of technological innovations, here the case of tea-intercropping, is related not only to economic development, but to social structure, cultural

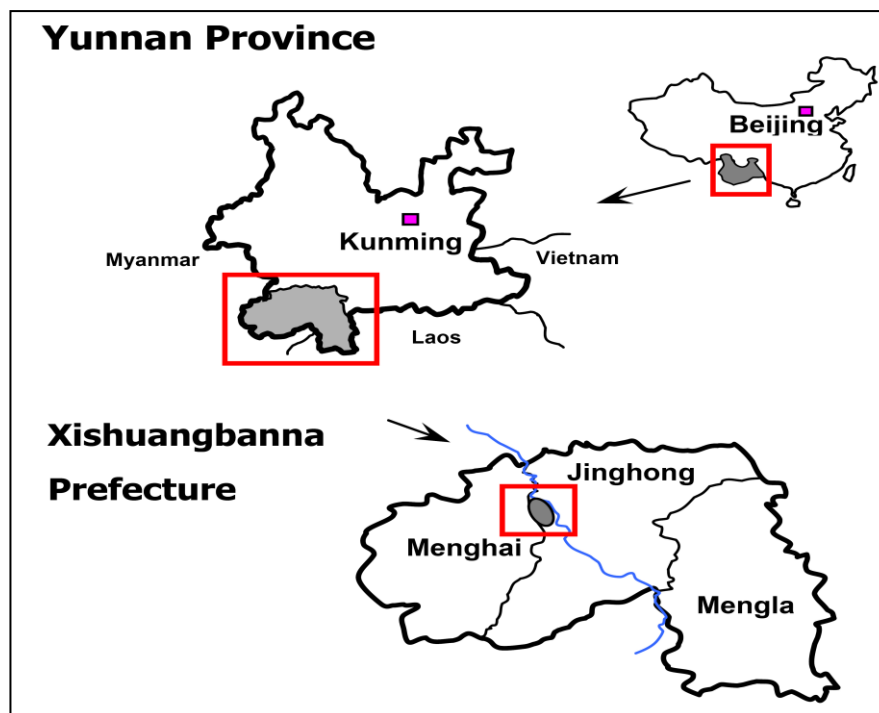
aspects, and environmental features; all corresponding and influencing each other. A way to look at co-evolution is circular: environment determines adoption and socio-cultural evolution, which influences environmental change, which again influences the evolution of society and culture.

2. METHODOLOGY

2.1 Location of the study

The study was carried out in the framework of the Living Landscape China (LILAC) project, a consortium of German and Chinese universities researching sustainable land options and biodiversity conservation in the Nabanhe National Nature Reserve (NNNR). The location chosen for the project was the Naban River watershed in the Dai Autonomous Prefecture of Xishuangbanna, Yunnan, Southwest China (figure 2).

Figure 2: Research Location



Source: LILAC 2008

2.2 Research methods

As the aim of this study was to examine social as well as environmental processes under different geographical and social conditions, a triangulation of qualitative research methods was chosen.

Two villages have been selected for this study; both with tea-intercropping, but with considerable differences in environmental and socio-economic conditions (table 1). 25 semi-structured in-depth interviews have been carried out with farmers either individually or as

group interviews with the whole family, usually two to three people. In order to create an open atmosphere and achieve cooperation of the farmers, the interviews took place in various unbiased social and work situations such as working in the fields with the farmers, dining with them etc. In addition to that, systematic observations, often during walks in and around the villages helped to crosscheck the information gained from the interviews. To complement farmers' views and knowledge, 15 experts have been interviewed in the prefecture's capital Jinghong, and also in Beijing. "Experts" are considered in this paper as people who are familiar with the area's socio-cultural or economic situation and/or have knowledge of the area's agricultural systems and forest ecosystems.

Table 1: Overview of the villages

	XiaoNouYouShangZhai	BengLong
Ethnicity	Lahu minority and Mountain Han	Hani (Akha) minority
Altitude	1550 m a.s.l.	900 m a.s.l.
Households	33	10
Proximity to main road	30-60 minutes of winding gravel road	10 minutes of easy drive
Main crops	Paddy rice, corn, tea, and hemp	Rubber + paddy rice (tea, corn, litchi, pomelo)
Farming conditions	85% of the farmers' arable land is sloping land for tea	Slopes not very steep; farmers have access to arable land for rubber and paddy rice
Animal husbandry	Pigs, chicken, buffalos and wild bees	Pigs, chicken and few buffalos

3. CO-EVOLUTION OF CULTURE, TEA CULTIVATION AND ENVIRONMENT PROTECTION

Cultural changes

Altitude is unmistakably influential on the choice of crops. In Xishuangbanna this is quite fundamental because altitude is a precondition for the possibility - or the lack - to grow rubber. In fact, being able to grow rubber or not has direct and indirect impact on societies, agriculture (selection of alternative crops), and the environment. Inhabitants of neighbouring villages, often not more than 10-15 km away from each other, behave differently. One evident indicator for development is the housing that changed in the low altitude into big concrete houses.

The different cultivations seem to be the beginning of a rapid cultural separation. This might lead for example in XiaNouYouShangZhai to "Tea-Lahu", who show social, cultural and economic variations to their relatives who live in the low altitudes and grow rubber, and in BengLong to "Ruber-Akah" who differ from those who live in the high altitudes and grow tea.

A difficulty to clearly define character changes of “Rubber-Akah” and “Tea-Akah” comes about from a generation gap. However, it is important to note that this study did not look at inter-generational differences. As the relation of society to its environment is one which evolves over time, behaviour changes are different between parents and children.

From tea to tea-intercropping

Although prices of tea underwent severe drop in the last 5-6 years, farmers in both, XiaoNouYouShangZhai and BengLong continue to grow tea. They stated that they “*do not want to cut the tea bushes yet*”.

Partly they do so because there is not enough ‘cash crops motivation’ to eradicate tea, i.e. possibility to grow crops which are economic alternatives to rubber. Tea has been part of the culture in the area for several centuries, knowledge that has been transferred from one generation to the next. Furthermore, Pu’Er tea is renowned for its high quality all over China.

Tea-intercropping seems to be an innovation that serves the purposes of maintaining a healthy agro-ecosystem, keeping an age old cultural aspect, and providing some protection from economic uncertainty. Lack of sufficient arable land was another reason to adopt the intercropping innovation.

The system works in such way that rows of tea bushes are grown and other crops, rubber or walnut are placed between them. The young walnut trees are placed in a distance of 10 m between each tree. Young rubber is placed in a similar way, and if old rubber is intercropped with tea, then rubber and tea are placed in separated interchanged rows. All this is a change to the old system of growing tea separately from any other crop.

In the case of tea-walnut intercropping, it was found that farmers divided into only two groups of adopters according to two stakeholders who introduced the innovation to them. Either the farmer bought the trees from the forest department, or he got it for free from an investor, who will later share a sum of the profits. The decision on ‘from whom do I learn about the innovation’ in so far was made according to whether the farmer had initial investment cash or needed to get the walnut in a lease-like agreement.

It could be observed that tea-intercropping coexists adjacent to other crop systems and to forest ecosystems. Some experts pointed out that tea although being a mono-culture, is not as bad a mono-culture as rubber, known to many in the area as the “Green Desert”: rubber plantations which look green from above, but dry the land to a point that it is as dry as a desert.

Environment Protection

Whereas in the low altitudes of BengLong soils are degraded and forests are cleared, in the high altitudes of XiaoNouYouShangZhai the quality of soil is still high and the forests have even grown over the last three decades. Obviously, young people in high altitude villages possess a lot of traditional knowledge of flora and fauna, more than young people in the low altitudes.

In several expert interviews it was argued that, if possible, farmers in higher altitudes would as soon as possible clear the forest in order to grow cash crops if they only had alternatives to rubber. This seems only partly true. Communities in the higher altitudes showed a strong connection to their surrounding forest ecosystems. Older members of one of the studied villages reported how dire the situation was when in the 1960s the forest around the village

was close to complete deforestation. This collective memory led to a social decision to protect the environment, allowing the forest to regenerate. This, in addition to new deforestation laws, also means that the farmers were forced to more intensively use smaller parts of arable land e.g. by intercropping.

4. CONCLUSIONS

While NORGAARD (1994) and MANNION (1995) argue that in relative terms ecosystems become simpler with the development of agro-ecosystems this study has shown that in the higher altitudes of XishuangBanna agro-ecosystems and forest ecosystems 'live' alongside each other and even benefit one another.

Village communities have social and technical capacity to try agricultural innovations and possibly adopt new land use strategies. This, however, is often held back by limited accessibility to external knowledge.

Collective memory is a strong social tool, which influences the relation of a village to its surrounding environment. In the case of XiaoNouYouShangZhai this turned out to be crucial in the implementation of environmental protection and sustainable land-use strategies.

The subdivision of ethnical groups ("Rubber-Akah"; "Tea-Lahu") arguably creates a risk of deepening economic gaps between farmers, sometimes of the same minorities in neighbouring villages of a small area. If the altitude is too high to grow rubber, farmers stick to tea and other crops, a choice that influences socio-economic evolution. This is an example where environmental conditions interact and influence directly the socio-economic situation. This does not only have a huge impact in terms of socio-economic aspects, but also one that might bring along significant cultural deviation. In this example too, tea-intercropping, an innovation which is brought about by environmental features such as arable land, accessibility and altitude, affects the evolution of culture, pulling it to a different direction than this of the farmers in the lower altitude. As for biodiversity in the area, it is clear that in high altitudes where rubber cannot be grown, ecosystems benefit. Furthermore, long run social system might also be the beneficiaries of this environmental development. In other words, the environmental development of the higher altitude, which is considered to be more sustainable, could bring slow but sustainable growth in living conditions, exposure to education, financial and capacity development.

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